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Ecological evaluation of economic evaluation of environmental quality

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Abstract

Environmental quality is a feature of the regulatory socio-natural relations, the functional significance of which lies in the ability to reflect the optimal processes of environmental safety. Philosophical and methodological interpretation of the problem, has the character to give solutions to the dialectical contradiction between the state of a natural element in biosphere, and the form that enables it to satisfy the needs of the society. Ecological and economic approach is based on identifying the environmental characteristics and interpreting their overwhelming majority, in quantitative terms. That is a problem of philosophical interpretation of qualitative and quantitative nature of the performance indicators. It is assumed that this approach should be supplemented with a qualitative assessment of the individual natural objects and reflect how the socio- economic significance of used and intended to use commercially valuable natural resources , and their system (bio- and geo-technological) status in the Biosphere complex. This approach can develop the methodological basis of a comprehensive assessment of the state of natural components, effective in an environment where nature a limited source of economic resources and the problem of optimization of social and natural cannot be reduced to optimize the quality of natural objects only by improving their economic performance.

Keywords: Environmental quality, comprehensive assessment, rents, quality and quantity of conjugated indicators of sustainable development

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1. Introduction

The problem of assessing the quality of the environment is a society-nature relationship optimization problem. It is not confined to the conservation and protection of nature from all forms of human impact. Quality of the environment cannot be kept static. It is a product of socio-natural interactions and a normal byproduct of human activity. People can only live in socially adapted conditions. Economic evaluation of environmental quality requires a set of economic, biological, medical, biological, aesthetic criteria. This approach poses the problem of conceptual integration of quantitative indicators of sustainability from the perspective of ecological and economic evaluation.

2. Research findings

The assessment of the natural environment quality under different circumstances is made using various evaluation criteria. If in one case the indicators of quality may be: the richness of species diversity, the diversity of forms and elements in food chains, the level of ecological plasticity of the species and so on, then, for example, to assess the quality of the polar biocenosis, the main indicators envisage the economization of metabolism, the ability to deposit in the body nutrient reserves and provide the necessary level of autonomy rhythm of life on the fluctuation of the external environment etc.

An even more specific qualitative assessment is the one for the agricultural ecosystems, the agrocenosis that are limited in the manifestation of their protective functions: nutrient cycling, regulation of populations, increasing species diversity, redundancy of system links etc. The functional incompatibility of the valuation techniques is a major obstacle in the development of social ecology as a scientific discipline.

The theoretical basis for the development of appropriate approaches to assess the quality of the environment, the formation of complex valuation principles allowing the assessment of the environmental quality in order to eliminate the internal contradictions between quantitative and qualitative indicators, is the philosophical methodology. The philosophical methodological development is the starting point for the valuation on environmental quality methodologies and allows one to create a comprehensive environmental function based assessment: environmental, economic, bio-geocenosis, medical-biological, aesthetical etc.

The ecological and economic unit is the most specific in the structure of a comprehensive assessment, as in the economic interpretation of the environmental issues dominating is the utilitarian approach of the assessment procedure. Since the first theoretical approaches on environmental economics of the human environment have been interpreted in strictly economic terms, and since that time the functional contradiction between quantitative and qualitative approaches to the study of the natural environment forced researchers to seek ways and means to shape comprehensive quantitative and qualitative interpretation.

In today's economy, such approaches are mainly developing mechanisms to assess significant characteristics of the material, expressed in certain cash equivalents, and in this respect the economic assessment of the environment has been developed on the areas of the environment, which is a source of raw materials.

Valuation approach from the perspective of identifying economically utilitarian benefits is based on the identification of quantitative characteristics and interpreted in their overwhelming majority, in numerical, that is, in terms of money. Trying to interpret the environmental assessment in neutral terms - points just does not solve the problem because the situation does not outweigh the highly specialized utilitarian approach. The use of "points" in the economic evaluation of natural resources is based on an integrative valuation of the natural environment, but the functional orientation of such an assessment is still utilitarian. It is based on the concept of economic expediency, and this shows the limitations of rent seeking assessment. The rent seeking approach is useful as a qualitative assessment from the point of view of society, the individual properties of the natural resources and reflects the economic importance of the exploited natural resources. Evaluation of natural systems in terms of industrial demand does not express the fullness of socio-natural relations, but its complexity, provides the necessary completeness and integrity of the evaluation operations. For example, a qualitative assessment of the land, i.e. system of comparing the relative productivity of the soil consists of:

- rents (i.e. qualitative assessment) for soil differences;
- valuation of land in terms of production costs, taking into account the efficiency, cost-effectiveness;
- land registration by groups of soils.

It is obvious that each of the marked components is a stage of the assessment process, and their system is a reflection of the assessment mechanism itself. In its fundamentals lies the definition of soil quality from the point of saturation with trace elements, biological productivity, environmental compatibility of a particular crop, agronomic viability, etc. Each of these quality characteristics is expressed in quantitative terms, and reflects the interdependence of quantitative and qualitative characteristics. Therefore, it seems fair to consider the rent seeking method as appropriate for the comparative evaluation of soil agronomic characteristics.

The rent seeking as qualitative assessment of individual natural resources (water, forests, land) cannot be used to assess the quality of the human habitation environment nor for structural, neither for functional manifestations. The qualitative assessment involves determining the content of the material and the structural element of the biosphere in a situation where social needs are assumed to have constant values not to be reduced, and the problem of social and natural correction is an unidirectional process. The lack of yield class is eliminated by increasing the social impact on the environment: the artificial soil fertility growth, the control of species composition of biocenosis, the selective actions on the population structure, etc.

In a social-environmental relation system, the social component is always a priority. The rent seeking problem in this case takes the form of the question of what changes are needed to be made in the environment to make it to the greatest extent consistent with the needs of the human being. It should be kept in mind that the natural state of the environment from the rent seeking perspective will never meet the needs of people in an environment where the natural fertility of the soil is not able to provide grain yield above 15 s / ha. The natural state of ecosystems preclude the human presence as an elementary unit, the natural productivity of the biocenosis not being able to provide the minimum subsistence of a person and as a whole it can be said that in the natural environment humans have no place. In this respect it is provided the threshold of the rent seeking environmental assessment, respectively the “solvency” framework. Its boundaries define the limits of the human impact on the environment. The process of rent seeking is not an improvement but adaptation of the artificial adaptation of nature to social needs.

The rapid development of artificial biocenosis is generally negatively rated by the supporters of the concept of non-interference in the biosphere. The features of the systemic organization of such ecosystems: low species diversity and weak biological productivity of monoculture agrocenosis, from their point of view, witnesses the regressive nature of this trend in the biosphere evolution.

In our opinion, an analysis based on a "whatever" approach of the relationship between humans and their social needs, inevitably leads to undue abstraction of conceptual constructs determining an overall vulnerability of this approach. No matter how attractive is the prospect of replacing monoculture agrocenosis with complex and biologically more productive natural ecosystems, in a socio-natural interaction context this option is in fact a dead end. It may be noted that the concept of biological productivity in this context contains conceptual abstraction, and in its realization it becomes obvious that the natural system produced biomass, in principle, cannot provide normal human life conditions. Humans need biomass in particular real manifestations, primarily in the form of food.

It may be noted that the concept of biological productivity in this context contains a conceptual abstraction, and its specification becomes apparent that the natural system produced biomass, in principle, cannot provide conditions for normal human life, which is necessary in a particular biomass manifestation primarily in the form of food.

As everybody knows, the foundation of any form of biological productivity is the net photosynthetic productivity as a ratio of daily increment of dry matter per unit of leaf area. Under ordinary conditions, the natural biological communities daily increase in dry mass weight is 150 kg/ha. In an agricultural culture biocenosis (with advanced agricultural technologies) the accumulation of mass is 600 kg/ha, which corresponds to a yield of 45-50 quintals of wheat per hectare.

Currently, worldwide agrocenosis occupy no more than 10% of total land area (1.2-1.3 billion hectares). Agriculture ecosystems provide humanity with 98% of food energy (88% cultivated and 10% pastures ecosystems). The share of "natural" primary bio-systems accounts for just over 2%, taking into account the fact that oceans’ products occupy a significant share.

These figures testify in favor of exhaustively culture biocenosis. One should realize that in the "natural", "pristine" nature humankind has no place, neither in its biological manifestation, nor in the social one. Only the development of artificial ecosystems can significantly augment, using technical and techno-biological means, and ensure normal development and the very existence of humans.

It should be noted that the conclusion on the theoretical possibility of technical endowment opportunities for natural systems is not agreed by all researchers. In this question, in our opinion, not enough sound is the complex technical ability to integrate in a biocenosis as a structural systemic element. In this respect, of interest are the arguments about the relationship between technique and nature, based on the machinery use in the garden. Machinery is needed in the garden, as without it the garden couldn't be neat and tidy. At the same time, machinery does not harmonize with the garden nor functionally, nor structurally because it is the opposite to life and disturbs the natural harmony of the garden.

Apparently, there is no use to dwell on the problem of "naturalness" of the garden, in which creation an indispensable part took the "machine" as a set of technical means of anthropogenic impact on environment. The criteria analysis by which the classification is made in internal "limited" systems and external "unlimited" elements is mistakenly done on the principle of the inexistence of human interdependence. The estimated differential is carried out on two grounds: first, on the belonging to the living, and, second, on the functionally lack of harmony of the machinery in relation with the culture biocenosis.

The lack of consistency of the first argument becomes obvious if we remember that the structure of the environment system is not only formed from living matter, but also from a-biotic elements - soil, water, and other specific landscape and other non-living components, as well as machinery, without which however, the living substance in the garden cannot exist. Therefore, considering these circumstances the criteria evaluation loses its rigor and acquires a certain subjective aspect.

With this approach, it becomes possible to arbitrarily manipulate the evaluation criteria based on the personal views of the positive and negative anthropogenic environmental impact.

This is also a subjective criterion of inorganic functionality of the ecosystem because it contains no answer to the question: "Can the garden maintain its systemic soundness in a non functional relation with the machine solely by implementing its own regulatory potential?" Such a response can only be negative. Any culture ecologic system cannot exist due to its internal reserves, regardless of technical endowment of the society. Permanent purposeful anthropogenic interference (cultivation, harvesting, irrigation etc.) determines the normal development of each agricultural biocenosis. Because such an impact can carried out only by the "machine", that is with the help of technical tools, we obtain a functional integrity "machine-garden". The technical complex (irrigation system, land cultivation etc.) is a necessary, internal component of any culture ecological system. Machine as a set of technical means is an organic garden. Its possibility to disturb the harmony of the garden is not excluded to the same extent that it is not excluded the probability of such violations from natural factors. Therefore a comprehensive economic and ecological evaluation based on the optimum relationship between living matter and complex artificial technical objects is needed.

Environment can and should be "optimized" by anthropogenic transformation. The assessment issue is solved by sufficient scientific basis of the assessment process, sound information on interaction parameters of the socio-natural relationships optimality and strict adherence to the evaluation criteria. In accordance with the received methodological scheme is necessary to define the baseline assessment, use traditional or create new assessment tools to develop a search algorithm, coordinate and control separate evaluation operations.

Theoretical description of the objects should be present in solving empirical and constructive tasks, when a classification of ecological linkages is needed. The result of this development is the formation of complex representation of the level and assessment criteria of socio-natural interaction.

In culture biocenosis there is no closure of systemic cycle of production of biomass, because the process is artificially interrupted and the bio-organic mass is extracted from the production cycle at an early stage. The functioning of culture ecosystems is built on a conscious violation of the law of return items and the threshold of the produced biomass depends on the non-returned to the soil elements used by organisms. It should be noted that as a result of the yearly harvesting, soil significantly reduces its vital content. Removing elements from the soil significantly undermines its fertility and finally depletes ecosystems if in the same time no biotechnological activities are carried out, including the return to the soil of lost mineral and organic elements.

In modern technical processes it is difficult to avoid disturbing the natural ecological processes. The self-regulation possibilities of the entire biosphere and its individual subsystems are far from unlimited. At the same time, society as an interdependence element is practically unlimited in its technological genesis capacity. Therefore, in the interaction society-nature appears as possible the stage when the biosphere, significantly undermining its self

management resources under the pressure of human impact, will be unable to maintain its structural and functional organization and the function of maintaining the dynamic balance of nature will have to be performed by humankind.

The ability to control the dynamics of biosphere processes and make periodic adjustments to the consequences of technological development of the natural sphere can be accomplished only at a high level of scientific and technical equipment of society and its social systems. Therefore, the yield of the complex confrontation between man and nature can be found in optimized regulatory anthropogenic activities on the environment.

Natural environment, i.e. all living organisms, is made up of many environmental factors that can be reclassified in different ways. An adequate assessment of the problem in a more consistent way classifies the environmental factors in four categories:

- *Inorganic*: composition and properties of the atmosphere, the gravitational force, the level of background radiation, the surface pattern and the climatic conditions - temperature balance, humidity, light etc.;
- *Hydroedaphic:* influencing factors of water and soil as the specific habitat of the living organisms;
- *organic or biotic*: impacts on organisms living matter of the biosphere - internal relationships, trophic etc.;
- *anthropogenic*: the impact of social factors on the environment.

The advantage of this classification is the dialectical relation of various factors on the principle of complementarity and interpenetration. Anthropogenic factor in actual practice of socio-natural interaction manifests itself through natural, by changing the qualitative and quantitative parameters to primary ones.

Built environment cannot be external, fundamentally different with respect to the biosphere. Bio-geocenosis in addition to social functions must preserve its functional defined division in a system of natural links. At the level of artificial ecological support systems of living matter requires an optimal combination of biological organisms' activities and technological activities of human society. In this case, the task is to conceptually combine the knowledge about natural environment and the role of man-made objects in a single eco-economic system.

The problem of replacing natural systems with self regulation mechanisms with anthropogenic ones is linked to the analysis of management capabilities and transformation processes of matter and energy, not only between living organisms and their environment, but also between man-made and natural systems. This task updates the formation of environment management strategies.

The problem of the environmental quality acquires the character of a solution to the contradiction between the state one biosphere natural element and the measure of its capability to meet the needs of an individual. Therefore rents become economic measures for the state of nature components, so the term is focused on the applied nature of socio-natural relations, when the natural environment is an endless source of economic resources. The social and natural optimization problem can be reduced to a series of specific problems to improve the quality of natural systems by improving the economic characteristics: soil fertility, species composition of the forest ecological community, reclamation of waterlogged and therefore economically non-productive land, etc.

There is a basic contradiction in the economic interpretation of the problem of environmental quality and without overcoming flawed assumptions it impossible to obtain a methodologically competent enough conjugation of quantitative and qualitative indicators and an integrated environmental-economic evaluation.

Utilitarian orientation estimates do not take into account the value of the environment itself. This approach is limited, as anthropocentrism does not imply the conservation of the natural environment as a self-sufficient and self-reliant system.

Briefly, the disadvantages of this approach can be expressed as follows:

- this approach falls significantly to estimate to quantify the block elements of the natural habitat : forests in a stage of successive changes , lakes that cannot be commercially exploited, but have significant ecological value, wetlands , without economic value until they are drained, but have an important role in terms of air purification, carbon sequestration and providing the necessary atmosphere for human and many other species;
- such an approach does not consider the "weightless" economically significant wilderness values and, moreover, do not find in them a source of significant economic benefits in the development of eco-tourism;
- the economic evaluation fails to value characteristics based on emotional perception of the environment, and its contribution to medical and biological processes, to the reduction of the psycho-emotional human stress;
- possible loss of economic benefits because of the dominance of the one-sided interpretation, and, consequently, because of the consumer approach to the benefits of the natural environment.

The raw approach, accompanied by the destruction of natural resources, excludes from the economic interpretation area the whole block of environmentally appropriate areas of social nature. Significant reserves of economic benefits from the social use of the environment have the so-called environmental services associated with the natural goods. Ecological and economic approach to the assessment of sustainable development in the functional sense is an economic assessment of the environmental impacts of either environmental benefits, or environmental losses resulting from socio-natural interactions at the level of human pressure.

This approach can be applied to develop assessment methodologies for the natural resources potential of an area, meaning an essentially comprehensive evaluation of the economic potential of the area, associated with the exploitation of its ecological status.

The need to develop market mechanisms in the field of environmental quality is based on a growing concern regarding the anthropologic impact on natural environment. Allocation of pollution certificates as well as their trade on the international market is not directly linked with the concept of the environment as a source of raw material resources, and it is based on the recognition of the uniqueness of historical natural biogeocenosis. As an economic tool in ensuring the optimization processes of nature, it can serve as payment for the environmental management. Schematically, the introduction of charges for natural resources is a means of economic regulation of the dynamics of nature. It is developed with the aim of achieving the highest valuation adequacy of the environmental impact of various forms of social consumption of natural environment. The greatest financial burden payment for natural resources should be in the area of human activity and resource intensive activities economically interpreted in the form of differential rent. As it is known, rents are treated in the economy as "God-given blessing" and are a specific form of obtaining material benefits associated with the circumstance of land ownership. Since abstract land does not exist on every piece of land something is growing, and what is growing fills that piece of land, the land can be evaluated on the basis of its natural conditions or artificial ones. Introduction of the differential rent is very specific and interesting aspect. By itself, the economic rent as the right to use land is quite abstract. In the event that a piece of land belongs to the property of a business entity should be considered a form of practical operation of this site. So, if the plot of land on which the natural, untouched, ecological system is not subjected to anthropogenic transformation, then this site cannot be considered as a source of raw materials. Without converting its land, the owner receives additional financial benefits from exploiting its ecological importance (relict species, unique character that can be represented by rare species of fauna, etc).

In this case, it appears a specific form of assessment that includes both ecological and economic indicators of sustainable development. If the land owner is the state, the withdrawal of the origin rental income may be gathered in the form of an environmental tax. The bottom line envisages the payment for the use of "weightless utilities", intangible and non-physical expression of environmental values for environmental locations situated anywhere.

Within an evaluation plan, this approach raises the problem of the conceptual integration of sustainability quantitative indicators from the perspective of environmental and economic assessment. Preservation of environmental services excludes industrial use of natural resources as raw materials. Therefore, the development of such mechanism could create the preconditions to create complex economic assessment methods of payment as environmental charges for the provision of environmental services.

The sensitivity of natural biological systems to the social influence upon the biosphere structure has an extremely heterogeneous character. The measure of anthropogenic factors participation to the matter and energy transformation expresses the degree of interpenetration of natural and social in every ecosystem. Ecosystems from different geographical regions experience different interaction characteristics for the natural and social factors expressing specific structural and functional organizations. Ecosystems resistant to human impact are best suited to maintain their functional relationships in the biosphere. Conversely, low ecological plasticity may be the cause of many human-induced changes.

The optimization of natural environment usage, taking into account its comprehensiveness and a transition from a one-way feed use to an integrated one, can bring significant economic and environmental benefits. The social use rationalization, with the optimization of the human impact on the natural environment, has significant reserves for improving welfare and sustainable development.

Conclusions

The above results of the study can serve as a conceptual basis for further scientific developments of various aspects regarding sustainable development through the application of innovative technologies and their widespread practical use.

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